Intelligent Transportation System Deployment Strategy for Saskatchewan

December 2001

This report represents the consensus of a broad base of groups and individuals interested in co-ordinating the deployment of Intelligent Transportation Systems in Saskatchewan.

103-03565/

Table of Contents

Executive Summary 1

1. Introduction 3

2. Background 5

3. Strategic Plan 7

4. Needs and Opportunities 10

5. ITS Deployment In Saskatchewan 13

6. Cost-Benefit Considerations 17

7. Recommendations 18

References 19

Appendices

APPENDIX A – Issues/Priority List

APPENDIX B – User Services

APPENDIX C – Intelligent Transportation Systems (ITS) in Canada

APPENDIX D – ITS Joint Steering Committee

Executive Summary

Saskatchewan's transportation system is essential to the province's economic and social well-being. The provincial transportation system connects rural Saskatchewan with the urban centres throughout the province. It also connects Saskatchewan with neighbouring provinces and our major trading partner, the United States. It supports tourism and international trade.

Saskatchewan Highways and Transportation, in the past year, has taken a lead role in developing a provincial Intelligent Transportation System (ITS) Deployment Strategy. A joint steering committee was established with participants from the public, private and academic sectors of the province. The goal of the strategy is to keep Saskatchewan road transportation systems safe, efficient, affordable, integrated and environmentally friendly.

The **Vision** for the future of ITS in Saskatchewan is to provide a safe, efficient and sustainable transportation system that enhances the quality of life for the people of Saskatchewan.

This strategy adopts Transport Canada ITS framework's four objectives:

- promote transportation safety and security (first priority);
- support trade and tourism through more productive and "smarter" transportation systems;
- improve our quality of life by promoting a more sustainable transportation system; and
- sustain a strategic investment in transportation.

Saskatchewan has a sparse population served by a vast road network. This network is costly to maintain and repair. Alternatives must be considered to use the existing road transportation infrastructure as efficiently as possible. ITS is an alternative adopted in Europe, Asia and North America.

From a global perspective, ITS applies to all modes of transportation, air, rail, marine and road. Because the stakeholders developing this strategy were primarily from the road transportation mode, this focus is on road transportation issues. The strategy will be expanded to become part of an entire transportation ITS strategy, which will include the other modes of transportation. This will require a co-operative effort with the stakeholders from these other transportation sectors of the transportation system.

This strategy was developed to be consistent with the Canadian ITS Architecture. The strategy is focused on providing a safe transportation system, a better environment for economic growth, enhanced productivity and a higher quality of life for all Saskatchewan residents.

Recommendations

- The existing joint steering committee will establish a permanent provincial ITS standing committee with this mandate:
  - keep ITS deployment strategy up to date by keeping abreast of Transport Canada ITS changes to the Canadian Architecture;
  - work with public/private sectors and universities within the province organizing seminars to raise awareness of ITS;
  - maintain a high level of awareness of other jurisdiction's ITS through forums and continued sharing of information;
  - stay current and in parallel with the Canadian ITS Architectural framework;
  - responsible for seeking out and promoting ITS deployment opportunities; and
  - actively seek out funding sources/partnership opportunities to support ITS deployment.
- ITS projects will follow the ITS Architecture for Canada;
- Short-term action plan will focus on planning of ITS deployment;
- A process will be developed for co-ordinating ITS road initiatives in the province; and
- That the joint steering committee's recommended action plan be considered for future ITS deployment by the provincial ITS standing committee.

1. Introduction

Saskatchewan's economy relies on the highway infrastructure and transportation services.

In the past, road authorities' solutions to transportation problems were to create more infrastructure and try to improve services. These solutions no longer adequately address the needs of the transportation industry and the motoring public. There is a need for accurate and timely information related to roadways. For example, travel weather information would:

- assist the trucking industry in better planning the movement of goods;
- assist motorists in making better travel decisions; and
- assist maintenance crews in becoming more efficient in maintaining roadways, especially during the winter.

With the introduction of new technologies defined as Intelligent Transportation Systems (ITS), public, private and academic sectors are seeing ways of providing solutions to challenges and demands on the transportation system. The ITS focus is on efficiency and integration of applications in developing ways to increase capacity, through better use of existing infrastructure.

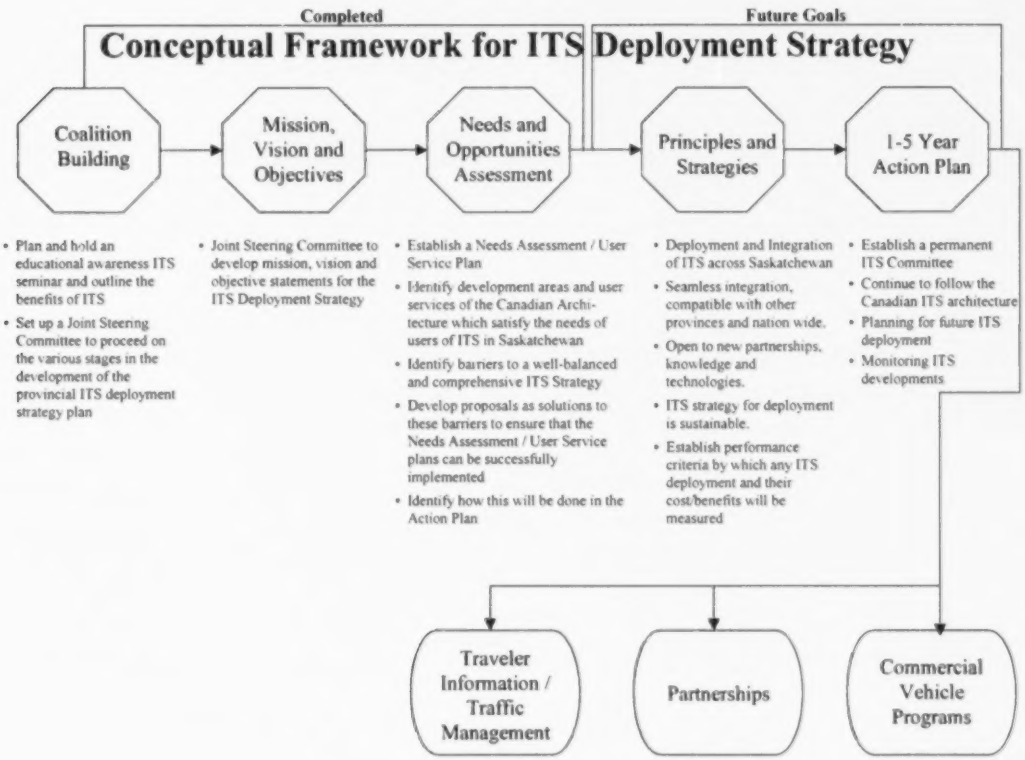
Saskatchewan Highways and Transportation, along with key stakeholders, has taken a lead role in developing a provincial ITS strategy. A joint steering committee was set up to develop this strategy. The steering committee included participants from the provincial, public, private and academic sectors of the province including:

- major urban municipalities;
- rural municipalities;
- universities;
- roadbuilders association
- trucking associations;
- Canadian Automobile Association;
- provincial government;
- crown corporations; and
- consultants and service providers.

A list of individual members is shown in Appendix D.

The ITS deployment strategy developed by the joint steering committee focuses on the future of ITS deployment in Saskatchewan. It identifies the need to be in compliance with the Canadian ITS Architecture in the deployment and integration of provincial ITS applications. The deployment of these technologies will be directed at improving safety and efficiency in the movement of goods and people on the provincial transportation system. This report's purpose is to lay the groundwork for the deployment of road transportation ITS Systems in Saskatchewan.

The following diagram illustrates the conceptual framework of the strategy:


Completed
Future Goals
Conceptual Framework for ITS Deployment Strategy
Coalition Building
Mission, Vision and Objectives
Needs and Opportunities Assessment
Principles and Strategies
1-5 Year Action Plan
• Plan and hold an educational awareness ITS seminar and outline the benefits of ITS
• Set up a Joint Steering Committee to proceed on the various stages in the development of the provincial ITS deployment strategy plan
• Joint Steering Committee to develop mission, vision and objective statements for the ITS Deployment Strategy
• Establish a Needs Assessment / User Service Plan
• Identify development areas and user services of the Canadian Architecture which satisfy the needs of users of ITS in Saskatchewan
• Identify barriers to a well-balanced and comprehensive ITS Strategy
• Develop proposals as solutions to these barriers to ensure that the Needs Assessment / User Service plans can be successfully implemented
• Identify how this will be done in the Action Plan
• Deployment and Integration of ITS across Saskatchewan
• Seamless integration, compatible with other provinces and nation wide.
• Open to new partnerships, knowledge and technologies.
• ITS strategy for deployment is sustainable.
• Establish performance criteria by which any ITS deployment and their cost/benefits will be measured
• Establish a permanent ITS Committee
• Continue to follow the Canadian ITS architecture
• Planning for future ITS deployment
• Monitoring ITS developments
Traveler Information / Traffic Management
Partnerships
Commercial Vehicle Programs

The strategy will require ongoing monitoring and updating to match available ITS technologies. This ITS strategy is intended to be a living document that will expand as future developments occur.

2. Background

What Is ITS?

Intelligent Transportation Systems (ITS) is a wide range of different technologies applied to transportation systems to improve safety, efficiency and reliability for the users of the transportation system. Improvements can be made without necessarily having to physically alter existing infrastructure. ITS provides for integration of drivers, vehicles and the transportation system as a means of achieving these objectives. Through integration of ITS applications, information can be shared provincially, nationally and internationally. ITS is evolving with the potential for benefiting public, private and academic sectors. Communication and information processing ITS applications will allow for real-time information to be gathered, stored and distributed to users of the system to help them make better decisions.

What Are The Benefits Of ITS?

Through effective deployment and integration within the road transportation system, ITS applications are a valuable technology tool allowing road authorities to better manage the transportation system. Some of the main benefits of ITS are:

- improved safety and security;
- improved environment impacts;
- improved system efficiency and cost effectiveness; and
- improved infrastructure reliability.

As new ITS technologies are developed, additional benefits to the transportation system will evolve. ITS will play an important role in addressing improvements in the following areas:

(a) Promote transportation safety and security (which will always be the top priority) through deployment of ITS systems. Some examples are:

- **Automated Roadside Weather Information System (ARWIS)**
  These applications provide real-time weather and road information to assist travellers/communities and the general transportation industry. This will reduce delays; improve roadway safety; and efficiency through route planning.

- **ITS pre-screening systems at border crossings**
  Governments and carriers have been alerted to the need for security awareness in the transportation sector as a result of recent events in the United States. ITS is a major consideration to address security issues.

(b) Support trade and tourism through more productive and "smarter" transportation systems. Weigh-in-motion, automatic vehicle identification and auto processing systems, in conjunction with security systems, can enhance pre-clearance of vehicles at inspection stations and border crossings. This would reduce the amount of time spent by the commercial and tourist industry in having vehicle inspections conducted.

(c) Improve quality of life by promoting more sustainable transportation systems. Innovative ITS alternatives will be considered as viable solutions to address increasing transportation costs. Once integrated into the transportation system ITS applications will improve the safe and efficient movement of goods and people on Saskatchewan highways. ITS will reduce harmful effects on the environment in many situations through emission controls and routing of traffic.

3. Strategic Plan

The **Vision** for the future of ITS in Saskatchewan is to provide a safe, efficient and sustainable transportation system that enhances the quality of life for the people of Saskatchewan.

The **Purpose** of the Intelligent Transportation System Deployment Strategic Plan is:

- to encourage implementation of integrated ITS technologies in the planning, design and operation of a safe and effective provincial/national transportation system; and
- to improve the competitiveness of Saskatchewan agencies and businesses by taking advantage of ITS technology.

The **Objective** of the ITS deployment strategy is:

- to bring an articulated and systematic approach to planning, deploying and integrating ITS technologies that conform to the Canadian ITS Architecture; and
- to serve as a roadmap for Saskatchewan agencies and businesses to set the direction and strategies for future ITS investment and deployment, which will enable:
  - the public to make better informed travel decisions;
  - Saskatchewan agencies to better manage, operate and maintain the transportation infrastructure and improve public safety and environmental concerns; and
  - the commercial operators to improve their productivity, efficiency and competitiveness.

Goals and Guiding Principles

- Deployment and integration of ITS across Saskatchewan:
  - integrate ITS early in the planning and design stages of a project;
  - establish a central information advisory;
  - develop a protocol for proposed ITS initiatives; and
  - develop and apply a model from information based on the needs assessment/user services project.
- Seamless integration compatible with other provinces and the Federal government:
  - identify and provide information on existing standards for ITS applications; and
  - participate and co-operate with Transport Canada, other jurisdictions and agencies, and work with industry and stakeholders.
- Open to partnerships, knowledge and technologies:
  - communicate and interact with Saskatchewan's public, private and academic sectors and other jurisdictions;
  - promote ITS initiatives and proposals from external groups;
  - promote awareness of ITS through collaboration with academics, apprenticeship and trade, and the research community; and
  - collaborate with suppliers on new and existing technologies and client needs.
- ITS strategies for deployment are sustainable:
  - promote cost sharing through partnerships with federal/other provincial/ municipal government, academic and private sector including U.S. bordering states; and
  - maintain harmonization with the Canadian ITS Architecture and ITS strategies.

Fundamental Objectives

The four fundamental points taken from the Canadian Architecture developed by Transport Canada were adopted as part of this ITS deployment strategy. These objectives are to:

- support transportation safety;

- support trade and tourism and economic development through more productive and "smarter" transportation systems;

- improve the quality of life by promoting more sustainable transportation systems; and

- sustain strategic investment for transportation.

To meet these objectives, the joint steering committee developed an Issues/Priority List in Appendix "A" and ranked the items according to the level of priority in achieving these objectives.

Identification of User Services

Based on local needs, the joint steering committee selected user services and sub-services that are relevant to Saskatchewan from the Federal ITS User/Services list. These user services (Appendix B) have been ranked to determine their priority to address these local needs throughout Saskatchewan.

The user services list indicates that the perceived need for ITS solutions is broad, but not particularly acute. In terms of relative priority of the ITS solution, it indicates that safety related ITS applications are seen as priority issues.

ITS applications related to efficiency and convenience, including travel information, and electronic applications scored slightly, but consistently, lower than solutions which directly impact safety.

The evaluation of specific projects should provide answers to four basic questions:

1. When should these specific projects be deployed? (In general, potential projects that address location and demonstrate the greater need based on cost benefit should be implemented first.)

2. What ITS application should be pursued? (Consider standards and integration possibilities.)

3. Where should these applications be deployed for specific projects?

4. How will the funding for the project be obtained? (Consideration given to developing cost/sharing partnerships with interested parties.)

4. Needs and Opportunities

Current Situation in Saskatchewan

To date, there have been few ITS road applications implemented in the province by the provincial government, municipal government and private sector. Current ITS applications focus on vehicle tracking and location systems, automated enforcement systems (weigh-in-motion and red light cameras), non-intrusive traffic detectors, integrated traffic management systems and roadside weather information systems.

ITS road projects are currently carried out and implemented on an ad hoc basis. To date, few ITS application standards or deployment strategy processes have been applied. The low number of these ITS applications in use in Saskatchewan may be advantageous to future expansion. Those involved in future ITS road application considerations in Saskatchewan will be able to reference this strategy using a systematic approach before making their final ITS decisions. This deployment strategy for Saskatchewan promotes compliance with Transport Canada's ITS Architecture guidelines, ITS application standards, ITS deployment and integration strategies for future ITS development.

Demographic Influences

Saskatchewan's rural population makes up 37% of the province's total population. In Saskatchewan there are approximately 26,000 km of highways, 53,000 km of grid roads and 108,000 km local rural roads. Traffic volumes on rural provincial highways range from a low of 20 vehicles per day on low-volume highways to a high of 5,000 vehicles per day on the higher-volume national highway system. Rural roads are fundamental for the transportation of goods and services to the rural areas. This rural road network provides access to the rural communities for residents/tourists and the service industry.

The demographics of the Saskatchewan population indicate a steady migration toward urbanization as the population continues to increase in the urban centres and decrease in rural areas.

Transportation issues are an important part of both urban and rural life in Saskatchewan. While transportation issues may be different, both areas can benefit from the proper deployment of ITS applications.

Rural Issues

- motor vehicle collisions on the rural and provincial roadways are generally more severe;
- goods movement and cost of obtaining goods tend to be higher in rural settings;
- availability of adequate and timely emergency response services due to remoteness;
- restrictive or non-existent public transportation systems; and
- weather impact on road conditions.

Urban Issues

- vehicle congestion creates safety, security, efficiency and environmental concerns that are more pronounced in major urban centres. This can also be an issue for timely emergency response;
- motor vehicle collisions (including pedestrian) in urban centres are more frequent due to more intersections and higher traffic volumes;
- most major distribution points are in major urban centres requiring concentrated truck traffic to these areas;
- heavy traffic use is an environmental issue with exhaust emissions, noise pollution and vibration; and
- dangerous goods (DG) routes often take DG loads through or near heavily-populated areas.

Common Rural and Urban ITS Issues

- creating the right message about the benefits of ITS;
- finding the right forum to promote ITS;
- funding;
- security; and
- collisions, cost in human life and property damage.

Common National ITS Architecture

ITS development and deployment strategies are moving forward around the world and other provinces in Canada. In each province, a common goal of ITS deployment is to align provincial ITS strategies with the Canadian ITS Architecture. Through the use of standardized ITS applications and intergratable systems, information can be shared with all the stakeholders of an ITS project – provincially, nationally and internationally.

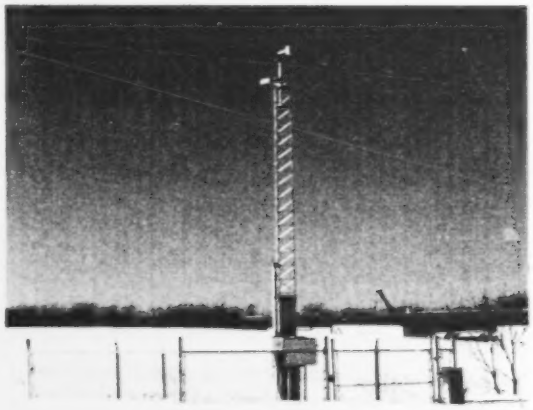
An overview of ITS in Canada, along with a diagram of the Canadian Architecture for ITS, is located in Appendix "C".

5. ITS Deployment In Saskatchewan

A limited number of ITS road systems have been implemented in Saskatchewan. A sample of ITS deployment projects implemented are:

a) Automated Road Weather Information Systems

This project will allow highway maintenance staff to have direct access to accurate road surface information. It will allow them to make immediate decisions on road maintenance for a specific area of the province. This will result in a more efficient use of maintenance equipment and resources. These ARWIS field stations give an early warning when driving conditions deteriorate. The real-time information enables maintenance crews to act before the first icy spots appear. These stations can also be integrated with ambient weather monitoring and thermister applications for providing above and below-ground temperatures. This real-time information can be made available to the motoring public for more efficient and safer trip planning.



Current Situation

There is currently one ARWIS site in operation in the province. A federal/provincial initiative is underway for the development of a national ARWIS system to allow for integration and sharing of information through an expanded network of this ITS application. Once the project is approved, funding resources between the federal and provincial governments will be addressed.

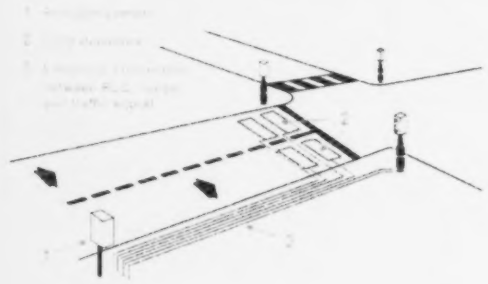
b) Red Light Camera System

Currently this system is in use at high-risk intersections in urban Saskatchewan. The aim is to reduce the number of vehicle accidents caused by drivers of vehicles that run red traffic lights. Cameras have been installed to record these violations. The vehicle owner

receives a citation based on information that was recorded of their vehicle going through a red light.

This ITS system could be integrated with photo radar and other traffic monitoring applications to provide a variety of traffic management information.

Red Light Camera System Components



Current Situation

Presently, there is a stand-alone system implemented in one Saskatchewan city. It is not integrated with other traffic management systems for information sharing or retrieval. Other Saskatchewan cities may consider the use of red light camera system in the next two to five years. Data will be compiled to determine the cost/benefit of using these cameras as it relates to traffic accident reductions at intersections.

c) Commercial Vehicle Operations – Enforcement Vehicles

Using wireless communication computers in enforcement vehicles allow enforcement staff to collect, store centrally and retrieve data at roadside inspection sites. It allows administrator-to-roadside and administrator-to-administrator interfaces. This system supports nation wide access to credentials and safety information for administrative and enforcement functions. This application could be integrated with remote changeable message signs warning motorists of safety hazards on the highway, work zone information and road conditions.

Enforcement Vehicle System

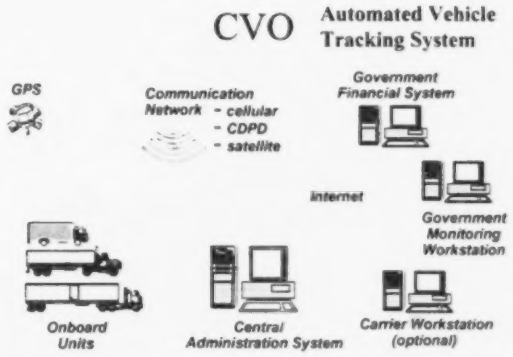
Current Situation

Used throughout the provincial enforcement community and linked nationally on a limited basis by provincial compliance staff doing roadside safety inspections on commercial vehicles operating within the province. This system allows for roadside inspections to be recorded and provides information storage and retrieval in a central location.

d) Commercial Vehicle Operations – Automated Vehicle Tracking System

Through the use of wireless communication systems, government trucking programs could monitor commercial vehicles in the program for speed, routing, hours of service and in some cases tire pressures (on units that are equipped with Central Tire Inflation systems). These systems are also used by trucking companies as a fleet management tool.

A concept drawing of the components that could be used in a vehicle tracking system is shown below.



Concept

Current Situation

Saskatchewan Highways and Transportation recently started using Global Positioning Systems on a small number of vehicles in the department's Trucking Partnership Program for the purpose of vehicle tracking. At this time, it is too early to evaluate the

cost/benefits of expanding the use of this system. Some commercial trucking companies have implemented the use this technology as part of their fleet management system. This technology is continually being expanded and is now available on some models of new cars and sport utility vehicles.

e) Trans Canada Highway ITS Project In Regina – Updated Traffic Signals

Previous traffic controllers were 20^{+} years old and could only provide a fixed-timed signal operation along the corridor. With new and more reliable traffic controllers and vehicle detection equipment, the side-street and left turn signal phases along the corridor are being actuated with any unused signal timings reverted back to the main street coordinated phase.

Current Situation

In September 2000, the City of Regina received partial funding from Transport Canada for the deployment of an ITS system. The total project cost is estimated at $830,000. The scope of the project is to update the traffic signal controllers along Victoria Avenue East (which is also Trans Canada Highway no. 1 within city limits) using U.S. National Electrical Manufacturers Association (NEMA) TS2 standards. The NEMA TS2 standards conform to the ITS standards identified in the Canadian Architecture. Video vehicle detection and communication equipment are also installed at signalized intersections to provide demand-responsive, coordination, vehicle counting and classification, and speed data simultaneously along the corridor.

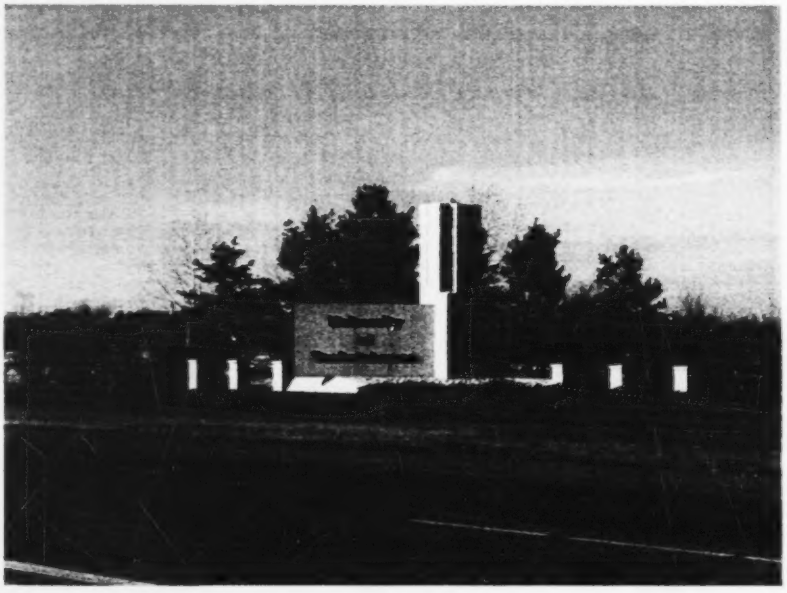
The University of Regina will perform a "before-and-after" study to document the delays, stops, travel speed and time, fuel consumption, and emissions. The study report will be completed by September 2002.

6. Cost-Benefit Considerations

The road system in Saskatchewan is extensive. Deploying ITS applications is costly. The focus would have to be determined by a needs assessment, location identification, potential benefits and resources available for each proposed ITS deployment project. Proper accounting of all social costs and benefits must be identified for all stakeholders. Funding availability will be a major barrier to many ITS projects. Partnerships with stakeholder groups and other interested parties will be a major consideration to overcoming this barrier. Once this occurs, cost/benefits can be measured over the scope of a project as it pertains to those partners involved.

Educational Opportunities

The University of Saskatchewan has started an ITS, Commercial Vehicle Operations Program for students. This program was implemented in partnership with an ITS provider, International Road Dynamics. Educational opportunities will expand as ITS becomes a way of life in Saskatchewan.



7. Recommendations

From the joint steering committee formed to develop this ITS deployment strategy, the logical progression for continuation of the ITS deployment strategy is recommended:

- that the existing joint steering committee will establish a permanent provincial ITS standing committee to:
  - keep the ITS deployment strategy up to date over time by keeping abreast of Transport Canada ITS changes to the Canadian Architecture;
  - continue to raise awareness of ITS by working in conjunction with public/private sectors, and universities within the province to organize seminars for this purpose;
  - maintain a high level of awareness on ITS development in other jurisdictions through international, national, and provincial forums and continued sharing of information;
  - stay current and in parallel with the Canadian ITS Architectural framework as a priority;
  - seek out and promote ITS deployment opportunities; and
  - actively seek out funding sources/partnership opportunities in support of ITS deployment
- that all ITS projects follow the ITS Architecture for Canada;
- that the short-term action plan focuses on future planning of ITS deployment in Saskatchewan;
- that a process be developed for co-ordinating ITS road initiatives within the province; and
- that the joint steering committee's recommended action plan set out in Appendices "A" and "B" be considered for future ITS deployment by the Provincial ITS Standing Committee.

References

Publications

Alberta Intelligent Transportation Systems (ITS) Strategic Plan (September 2000)

An Intelligent Transportation Plan for Canada: En Route to Intelligent Mobility (November 1999)

Intelligent Transportation Systems Architecture for Canada v. 1.1

International Documents

Iowa DOT Integrated ITS and Services Deployment Plan (Draft Report) (April 2000)

United States of America, Department of Transportation, Federal Highway Administration, *Intelligent Transportation Systems Benefits - 2001 Update* (June 2001)

Web Sites

http://www.benefitcost.its.dot.gov

http://www.itsa.org

http://www.itscanada.ca

http://www.itsdocs.fhwa.dot.gov

http://www.itsinternational.com

http://www.itsmn.org

http://www.its.dot.gov/home/htm

http://www.its-sti.gc.ca

http://.www.ite.org

http://www.mitretek.org/its/benecost.nsf

http://www.nawgits.com/icdn

Fundamental Objectives (Issues/Priority List)

Issues/Priority List

	Ranking
• Infrastructure Management o Recognize legacy and existing technical and physical ITS systems	1
• Access to adequate transportation (systems) o Support rural communities re: transportation issues	2.4
• Cost/economics o Voluntary adoption/participation	2.0
• Environmental impact	1.7

• Road safety
  o Public awareness
  o Integrity of data/statistics (crash data) used for comparison purposes
  o Wildlife
  o Rail crossings/major intersections
	2.5

• Competitiveness	2.3

• (Regulatory/technological) compatability/integration
  o inter-jurisdictional
  o inter-user
	2.3

• Geographic layout/distances	3.1
• Demographics	3.0
• Modal shift	2.6
• Deployment (location/data warehousing)	2.8

• Traffic management (urban/provincial)
  o Urban arterial services/congestion
  o Truck traffic/LCVs/DG
  o Navigation/route guidance
	2.2

• Emergency response/management	1.9
• Enforcement of regulations/statutes o Voluntary compliance	2.5
• Weather	1.7

Rank from 1 to 5 – 1 being the most important, 5 being the least important.

Fundamental Objectives

Developed to meet the:

- support transportation safety;
- support trade and tourism through more productive and "smarter" transportation systems:
  - economic development
- improve quality of life by promoting more sustainable transportation systems; and
- sustain strategic investment for transportation.

User Services

Development Area	User Service	Sub-Service	Rank
Traveler Information Services	Traveler Information	Real-Time Ridesharing Information	3.7
		Interactive Traveler Information	3.0
		Broadcast Traveler Information	2.6
	Route Guidance And Navigation	Autonomous Route Guidance	4.0
		In-Vehicle Signing	4.0
		Dynamic Route Guidance	3.6
		ISP-Based Route Guidance	3.3
		Traffic Estimation And Prediction	3.3
	Ride Matching And Reservations	Real-Time Ride Matching	4.4
		Ride Matching	4.3
	Traveler Services And Reservations	Regional Parking Management	3.5
		Services Purchases And Reservations	3.3
		Parking Facility Management	3.2
		Traveler Yellow Pages	2.9

User Services

Development Area	User Service	Sub-Service	Rank
Traffic Management Services	Traffic Control	Virtual TMC	4.1
		Probe-Based Flow Monitoring	3.8
		Regional Traffic Control	3.0
		Surface Street Control	2.8
		Traffic Information Dissemination	2.6
		Highway Control	2.5
		Traffic Network Flow Monitoring	2.3
		Traffic Estimation And Prediction	3.1
	Incident Management	Incident Prediction System	3.1
		Incident Management Coordination	2.4
	Travel Demand Management	Reversible Lane Management	4.2
		Predictive Demand Management	4.2
		HOV Lane Management	4.0
	Environmental Conditions Monitoring	Roadway Environmental Sensing	2.0

User Services

Development Area	User Service	Sub-Service	Rank
		Emissions Management	3.5
		Road Weather Information System	1.6
		Vehicle-Based Sensing	2.7
	Operations And Maintenance	Infrastructure Maintenance Management	1.5
		Smart Work Zones	3.1
	Automated Dynamic Warning And Enforcement	Dynamic Roadway Warning	2.3
		Variable Speed Limit And Enforcement	2.8
		Signal Enforcement	2.3
	Non-Vehicular Road User Safety	Mixed Use Warning Systems	3.3
		Automated Non-Vehicular Road User Protection	3.6
	Multi-Modal Junction Safety And Control	Basic At-Grade Crossing Control	2.0
		Advanced At-Grade Crossing	2.0
		Modal Operations Coordination	3.4
Public Transport Services	Public Transport Management	Transit Vehicle Tracking	3.3

User Services

Development Area	User Service	Sub-Service	Rank
		Transit Fixed-Route Operations	3.2
		Passenger And Fare Management	3.2
		Transit Maintenance	3.5
		Multi-Modal Coordination	3.5
		Multi-Modal Connection Protection	3.9
	En-Route Transit Information	En-Route Transit Information	3.5
	Demand Responsive Transit	Demand Responsive Transit	3.4
	Public Travel Security	Public Travel Security	3.6
Electronic Payment Services	Electronic Payment Services	Electronic Toll Collection	3.2
		Electronic Parking Payment	2.9
		Transit Services Payment	3.3
		Traveler Services Payment	3.3
Commercial Vehicle Operations	Commercial Vehicle Electronic Clearance	Electronic Clearance – Permitting	1.9
		International Border Crossing Clearance	2.0

User Services

Development Area	User Service	Sub-Service	Rank
		Weight-In-Motion (WIM)	1.7
	Automated Roadside Safety Inspection	Inspection Support Systems	2.0
		Automated Vehicle Safety Read Out	2.8
	On-Board Safety Monitoring	On-Board Safety Monitoring	3.0
	Commercial Vehicle Administrative Processes	Commercial Vehicle Administrative Processes	3.3
	Intermodal Freight Management	Freight In-Transit Monitoring	3.6
		Intermodal Interface Management	3.4
	Commercial Fleet Management	Fleet Administration	2.9
		Freight Administration	3.4
		CVO Fleet Maintenance	3.0
Emergency Management Services	Emergency Notification And Personal Security	Personal Security	3.4
		MAYDAY Support	2.9
	Hazardous Material Planning And Incident Response	Hazardous Material Planning And Incident Response	2.6
	Disaster Response And Management	Disaster Command and Control	2.4

User Services

Development Area	User Service	Sub-Service	Rank
		Disaster Information Dissemination	2.4
	Emergency Vehicle Management	Emergency Response Management	1.9
		Emergency Vehicle Routing	1.3
Vehicle Safety And Control Systems	Vehicle-Based Collision Avoidance	Lateral Warning Systems	2.8
		Lateral Collision Avoidance	2.7
		Longitudinal Warning Systems	2.8
		Longitudinal Collision Avoidance	3.0
	Infrastructure-Based Collision Avoidance	Intersection Collision Warning	2.2
		Intersection Collision Avoidance	2.6
	Sensor-Based Driving Safety Enhancement	Sensor-Based Driving Safety Enhancement	2.5
	Safety Readiness	Vehicle Safety Monitoring	2.8
		Driver Safety Monitoring	2.7
	Pre-Collision Restraint Deployment	Pre-Collision Restraint Deployment	3.4
	Automated Vehicle Operation	Automated Vehicle Operations	4.2

User Services

Development Area	User Service	Sub-Service	Rank
Information Warehousing Services	Weather And Environmental Data Management	Roadway And Weather Data Fusion	1.8
		Environmental Information Dissemination	2.2
		Roadway Meso And Micro Prediction	3.2
	Archived Data Management	Archived Data Mart	3.3
		Archived Data Warehouse	2.9
		Archived Data Virtual Warehouse	3.0

Intelligent Transportation Systems (ITS) in Canada

Deployment Concerns

A national survey of provincial jurisdictions carried out by the Transportation Association of Canada (TAC) previously, identified opportunities and barriers to ITS deployment in Canada.

The common ITS areas identified as opportunities throughout Canada, along with barriers that would have to be overcome to take advantage of these opportunities, is shown in the table below:

Common ITS Opportunities	Barriers That Need Solutions
• Border crossing/trade corridors • Data collection, storage and retrieval • Safety road maintenance • Traveller information provided • Traffic management systems • Roadside information for enforcement	• Lack of national and regional strategies • Lack of funding and high costs in relation to benefits achieved • Shortage of adequate staffing required with necessary skills and knowledge

Canada faces many challenges in the whole area of ITS deployment. The geographical size of the country, low population, unpredictable climate changes, communication requirements and organizational relationships will have a major impact on integration of ITS into the transportation systems.

Transport Canada

Transport Canada has assumed a key role in developing a national ITS plan. Transport Canada promotes the use of ITS and has indicated that future federal funding will likely be available for ITS projects.

Canadian ITS Architecture Developed

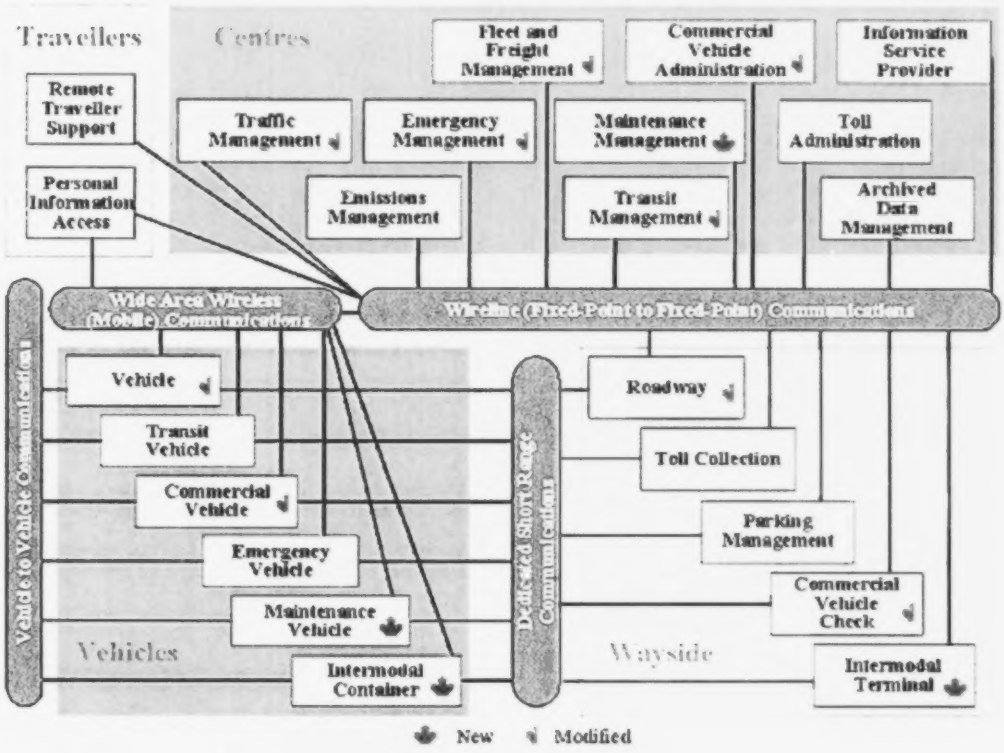
The Canadian ITS Architecture has been developed and comprises both the physical and the logical architecture for ITS deployment.

It provides a framework for communication among various ITS technologies and identifies a number of Canadian ITS User Services.

Because of the close ties and benefits of interoperability Canada has with the United States, Canada's ITS architecture was modelled after the American ITS architecture. Canada's distinct features were incorporated into the national ITS architecture.

The diagram below illustrates the framework of the Canadian ITS architecture and identifies new and modified areas that have Canadian features.

Canadian ITS Architecture



ITS Joint Steering Committee

Robert (Bob) Billington, Department Policy and Planning Division
Alf Guebert, Earth Tech Canada Inc.
James Leier, Moose Jaw Regional Economic Authority Inc.
Brian Taylor, International Road Dynamics Inc.
Curtis Berthelot, University of Saskatchewan
John Meed, Department Transport Compliance Branch
Allan Duff, City of Regina
Brian Boyes, City of Saskatoon
Mervin Kryzanowski, Area Planning Committee
Terry Kostyna, Saskatchewan Trucking Association
Gary McClelland, Department Operations Branch, Central Region
Kwei Quaye, Saskatchewan Government Insurance
Andy Nagy, C6 Safety Association of Saskatchewan Inc.
Cheryl Taylor, Department Policy and Planning Division
Jim Wiese, Saskatchewan Telecommunications
Andrew Liu, University of Regina
David Schnell, Area Planning Committee
David Williams, Saskatchewan Communications
Gordon Sparks, Canadian Automobile Association
Brent Warner, Saskatchewan Roadbuilders Association
Val Jakubowski, Saskatchewan Roadbuilders Association

For further information, please contact:

Policy Advisor
Policy and Planning Division
Saskatchewan Department of Highways and Transportation
9th Floor
1855 Victoria Avenue
REGINA SK S4P 3V5
Telephone : 306-787-5307
Fax: 306-787-3963